DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers

CECW-EE | Washington, DC 20314-1000 | ETL 1110-2-360

Technical Letter
No. 1110-2-360

31 December 1993

Engineering and Design
BRAKE WHEEL PROBLEM ON TAINTER GATE HOIST MACHINERY

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Report Documentation Page

Report Date	Report Type	Dates Covered (from... to)
31 Dec 1993	N/A	-

Title and Subtitle Engineering and Design: Brake Wheel Problem on Tainter Gate Hoist Machinery	**Contract Number**
	Grant Number
	Program Element Number
Author(s)	**Project Number**
	Task Number
	Work Unit Number
Performing Organization Name(s) and Address(es) Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	**Performing Organization Report Number**
Sponsoring/Monitoring Agency Name(s) and Address(es)	**Sponsor/Monitor's Acronym(s)**
	Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited	
Supplementary Notes	
Abstract	
Subject Terms	
Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU
Number of Pages 4	

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1. Purpose

This engineer technical letter (ETL) provides information concerning brake wheels (drums) which have a tendency to "walk off" the shaft at the gear box on tainter gate hoists. This can cause damage to the tainter gate and its operating equipment. This ETL provides one solution to the problem.

2. Applicability

This ETL applies to HQUSACE elements, major subordinate commands, districts, laboratories, and field operating activities having responsibilities for civil works projects.

3. References

a. EM 1110-2-2702, Design of Spillway Tainter Gates.

b. CWGS-14615, Electrical Equipment for Gate Hoists.

4. Discussion

a. On 6 July 1993 the No. 2 tainter gate at Old River Auxiliary Structure fell a distance of 2 m (6-1/2 ft) from its opened position and impacted the gate sill. The damages included the service bridge's downstream concrete parapet wall and handrail, a line shaft segment and its support brackets between piers, and a cooling fan attached to the motor. A team from New Orleans District made a field investigation. The team concluded that the brake failed on the motor controlling the operation of gate #2. The brake failed when the brake drum "walked off" from its shaft (Figure 1). An inspection of other gate motor brake drums at the same facility revealed that another drum had also begun to "walk off" from its shaft (Figure 2).

b. The brake is a Cutler-Hammer Type GH505, 254-mm (10-in.) D-C Magnetic Shoe brake manufactured by EATON Corporation. The brake drum to the shaft has a loose fit which is not adequate for this type of application. A key held by a set screw is used to transmit the torque.

c. The same problem was discovered during periodic inspection No. 6 at Canton Lake, North Canadian River, Oklahoma. Periodic Inspection Report #6, dated November 1992, paragraph d(2) states: "It was noted that the brake drums on tainter gate Nos. 3, 8, and 12 were partially off the keyed shaft resulting in a lining to drum contact area of less than 100 percent."

d. These brakes for the electric motor driven tainter gates are common at Corps projects. They are included in EM 1110-2-2702, Design of Spillway Tainter Gates and specified in CWGS-14615, Electrical Equipment for Gate Hoists. To ensure continuation of the safety, stability, and operational capability of the Corps facilities having these components, remedial actions are required.

5. Requirements

a. All facilities having this type of arrangement should be checked immediately. If the above condition exists, the drums should be repositioned and a positive mechanical stop placed on the end of the reducer shaft to secure the brake drums from "walking off." For example, the shaft can be threaded at the end and fitted with a A325 high-strength bolt with thread locking compound (Locktide) and a large plate washer to hold the drum in place (Figure 3). Locking compound can be used between the brake drum and the shaft.

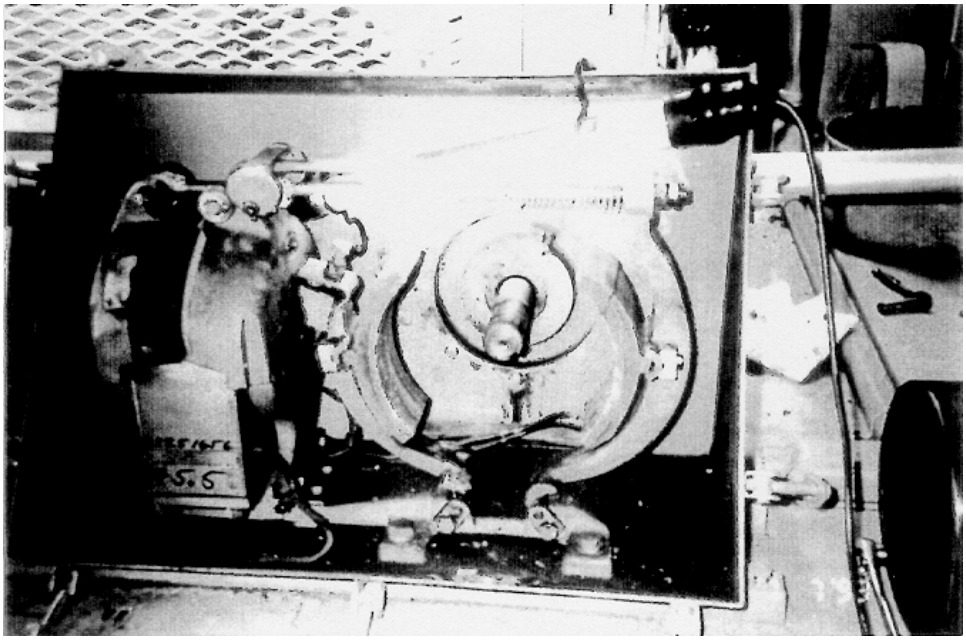

Figure 1. Brake assembly where the brake drum "walked off" from the shaft

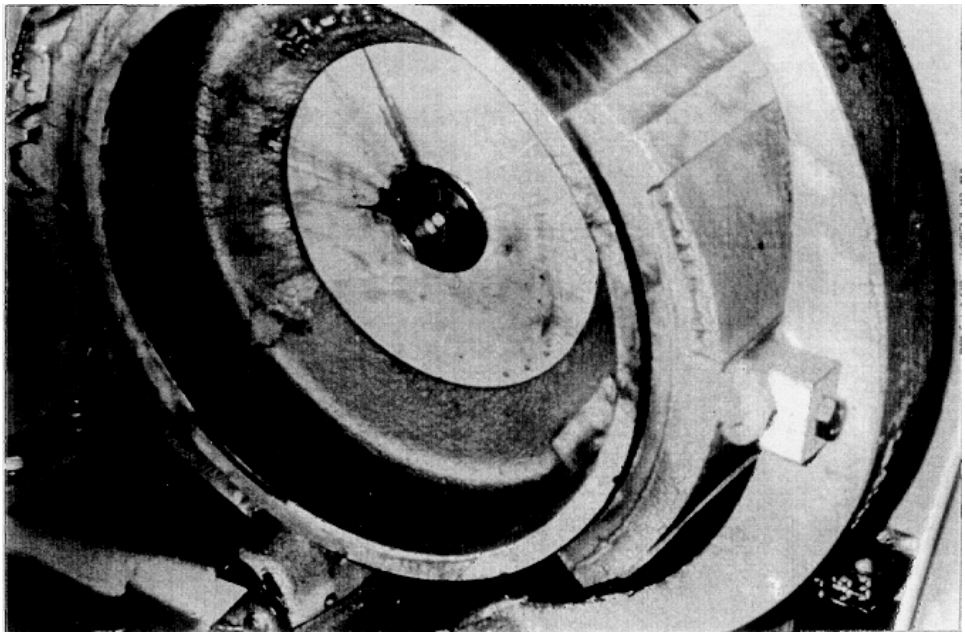

Figure 2. Brake drum that has "walked off" slightly from its shaft

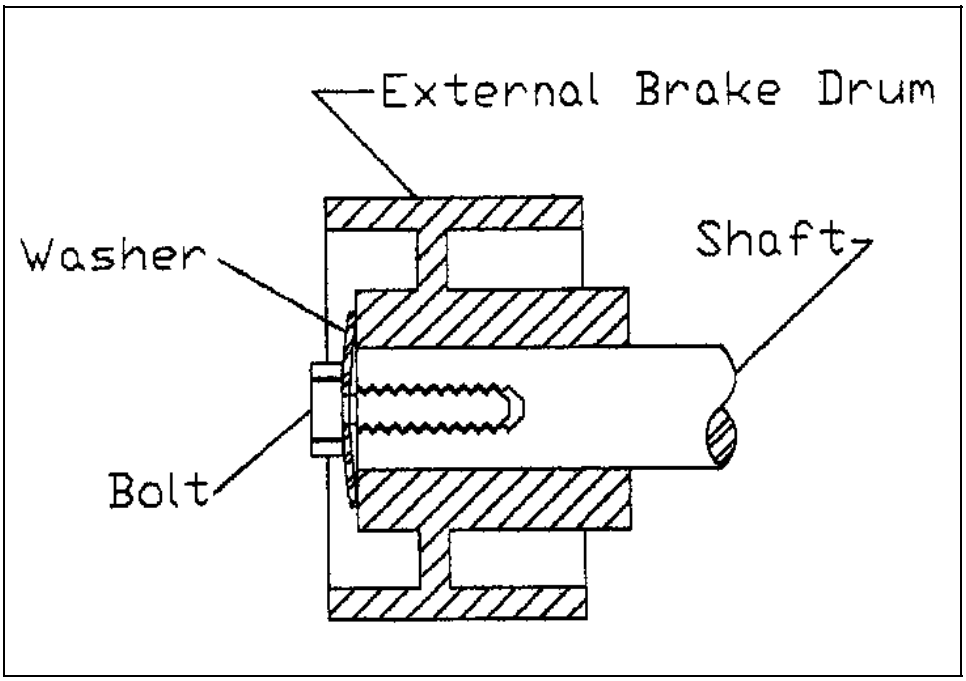

Figure 3. Shaft fitted with a high-strength bolt (no scale)

b. The inspection of the brake drums shall be added as one of the annual inspection and maintenance items.

c. CWGS-14615, Electrical Equipment for Gate Hoists, will be revised by CECW-EE to include a positive mechanical stop to hold the brake drum to the shaft. The brake drum to shaft will have a taper fit or a ASA class FN1, light-drive fit.

FOR THE DIRECTOR OF CIVIL WORKS:

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